

〈論文〉

Pienemann's Teachability Hypothesis and Processability Theory and their Implications for Error Correction in Classroom-based Second Language Learning

Michael Mielke

1. Introduction

In second language acquisition it seems to have been generally agreed that learners follow a predictable path in language production and that there are predictable stages in the learning or acquisition of various structures (Long 1990 ; VanPatten and Williams 2007). Furthermore, an 'interlanguage' is created by the learners which is based on an active reconstruction of the target language, and that the acquisition of language structures is very similar among different learners and different languages. (Selinker 1972). This paper will investigate one theory of second language acquisition called Processability Theory (PT) which seeks to explain how language acquisition occurs in terms of psycholinguistic factors for the development of the interlanguage due to constraints caused by language processing (Pienemann 1998). Encapsulated within PT is the Teachability Hypothesis (TH) which states that language items can only be successfully acquired when learners are at the right stage of interlanguage development to acquire them (Pienemann 1984). In other words, "...the effect of teaching intervention is constrained by the learner's current state of development" (Pienemann 2015, 137). Many studies suggest this to be true — that stages in interlanguage development cannot be skipped with formal target language instruction (See Appendix A for a brief overview of 6 teachability studies). For these reasons, PT and its more practical considerations for teaching suggested by the TH are very important to understanding language acquisition and the development of interlanguage, especially in a formal

classroom setting. This paper will describe the development of Pienemann's TH and PT and, after establishing their validity, discuss their implications for error correction in classroom-based second language learning.

2. Teachability Hypothesis and the development of Processability Theory

The origins of the Teachability Hypothesis and Processability Theory stem from research studying the development of word order in German as a second language (see Clahsen 1980 ; Clahsen, Meisel, and Pienemann 1983 ; Meisel, Clahsen, and Pienemann 1981 ; Pienemann 1980, 1981, cited in Pienemann 1998, 9). From their research, the Multidimensional Model (MM) of language acquisition was formed. This model derived its name from the fact that it had two dimensions, namely developmental and variational. The developmental aspect refers to the fact that grammatical features emerge in a fixed order (to see the stages of acquisition of German word order, please see Appendix B) that is "...unaffected by aspects of the learner or of the environment" (Cook 1993, 93). Variational aspect refers to the fact that acquisition can be affected by factors such as student motivation or the extent to which a learner is integrated into the target language (TL) culture. This variation also takes place over time and the form of interlanguage can vary in the same learner even within short periods of time. However, once a variational feature is produced, even if it is not perfectly accurate, it may be teachable. The idea of an implicational hierarchy was formed from these studies. An implicational hierarchy means that learners who reach one stage of a target language should be able to produce rules at lower stages (Gholami and Abedini 2018). In other words, "...the structure of a given interlanguage can be described as the sum of all the rules the learner has acquired up to a certain point" (Pienemann 1998, 9). In 1984, Pienemann put forth the Teachability Hypothesis which states :

...the teachability of L2 structures is constrained by the same processing restrictions that determine the developmental sequences of natural language acquisition : since the processing procedures of each stage build upon the procedures of the preceding stage there is no way to leave out a stage of the developmental sequence by the means of formal teaching. (Pienemann 1984,

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This was an important insight because it suggested that L2 language acquisition was similar to L1 language acquisition and that the process of natural acquisition cannot be altered by instruction. Pienemann (1989) further supported the TH hypothesis with a study that showed L2 learners who were at Stage x and Stage $x+2$ in their interlanguage development, according to the development of German word order (see Appendix B), were only able to produce Stage $x+3$ in natural speech if they were initially at Stage $x+2$ despite all of the children being taught together and all students showing mastery of the language in the classwork (Pienemann 1989).

In the 1990s, Pienemann developed his Processability Theory (PT) which is a framework for a psycholinguistic theory of second language acquisition to explain the developmental problem that causes the target language to follow a describable route, and the logical problem of language development, or how children are able to develop language ability in a relatively short period of time and with limited linguistic knowledge (Wexler 1982, cited in Pienemann 1998, 2).

PT takes Levelt's theory of language production (1989, 1993, cited in Pienemann 1998, 2) as its starting point. Following are the 4 key premises and their implications :

- 1) Processing components are relatively autonomous specialists which operate largely automatically. Automaticity allows for the speed needed to process and produce language ;
- 2) Processing is incremental. Levelt says that "the next processor can start working on the still-incomplete output of the current processor" (1989, 24, cited in Pienemann 1998, 3). Because of this, every processing component only deals with a small section of the current processing event. Pienemann (1998) says that this makes the use of storage facilities necessary "for non-linearity in the matching of underlying meaning onto surface form." (3) ;
- 3) The output of the processor is linear, though it may not be mapped onto the underlying meaning in a linear way. For example, in the simple sentence, 'He drinks beer', grammatical information must be stored regarding person and number before the verb is formed ;
- and 4) Grammatical processing has access to a grammatical memory store. In order for the mapping to take place, information needs to be held for a short time to form the message.

From these premises, Pienemann was able to create a "hierarchy of processing

resources" (8), to which he added the cognitive principle of "perceptual saliency" which suggests that "the first and last stimuli is more marked than the other stimuli and is persistently reproduced and learned better" (Murdock 1962, cited in Pienemann 1998, 8). This concept was used to explain the occurrence of adverbials at the beginning or at the end of sentences. With these concepts in place, PT suggests the following hierarchy of processing resources (Pienemann 1998, 8) :

- 1) Word/lemma
- 2) Category procedure (lexical procedure)
- 3) Phrasal procedures (head)
- 4) S-procedure and word order rules + saliency
- 5) S-procedure and word order rules - saliency
- 6) matrix/subordinate clause

The next important step in Processability Theory was adding a theory of grammar that could interpret the processability hierarchy to make it relevant to grammatical structures in individual languages and act as a "kind of short-hand which contains the necessary elements to relate structures to a hierarchy of processability" (Pienemann 1998, 8-9) . The theory of grammar chosen was Lexical-Functional Grammar (LFG) (Kaplan & Bresnan 1982) because of its ability to represent the incremental processing and the grammatical memory store mentioned above by using LFG's feature unification (Kaplan and Bresnan 1982), and this particular aspect can make "...a comparative metric to evaluate the developmental level of inter-language (IL) forms" (Pienemann 1998, 9) .

The final aspect of Processability Theory that needs to be understood, especially in its implications for learner variability and error correction, are the ideas of "developmental dynamics" and "generative entrenchment" (14-15). Developmental dynamics means that interlanguage decisions made early on can "bias the further development of the interlanguage system" leading to very different outcomes despite following fundamentally similar paths of language processing (15). Pienemann refers to "generative entrenchment" (Wimsatt 1986, 1991, cited in Pienemann 1998, 15) which is traditionally used to describe developmental processes in biology and philosophy,

to describe how “the earlier a decision is made in structural development, the more far-reaching the consequences for the ultimate stage in structural development” (Pienemann 1998, 15). This is because once a developmental structure has been added to a previous one, “it is very costly, (in terms of computational power) if not impossible, for the developmental process to move to a different developmental path” (15).

In summary, Processability Theory provides a framework for a psycholinguistic theory of language acquisition that explains developmental sequences in terms of language processing. It can address issues of interlanguage variability, stabilization (fossilization), and differences between first and second language acquisition across many typographically different languages such as Arabic, Chinese, Italian and Japanese (Mansouri 2005, Zhang 2005, Di Biase & Kawaguchi 2002, Kawaguchi 2005, cited, respectively, in Pienemann & Keßler 2011, ix). The Teachability Hypothesis, which was developed much earlier than Processability Theory but has been formally incorporated into its framework, describes the effects of psycholinguistic constraints for language acquisition. Both PT and TH have been subject to numerous empirical studies. Some researchers are actively studying how to integrate PT into psycholinguistic methods of language teaching (Keßler 2008a, 2008b, Di Biase 2008, Mansouri & Duffy 2005, cited in Pienemann & Keßler 2011, ix). Due to the strong support of PT for language acquisition and also its current relevancy in SLA research, the following section will look at the implications of Pienemann's Processability Theory and Teachability Hypothesis for error correction in the classroom.

3. Discussion of implications for error correction in the second-language learning classroom

Pienemann's Teachability Hypothesis, based on a solid background of empirical research in the framework of Pienemann's Processability Theory, shows that a second language learner cannot acquire a structure that is at a higher level than the learner's processing ability. There is even some research that suggests teaching structures that do not follow natural sequences will not only not be acquired, but may in fact hinder language acquisition (Hahn, 1982 ; Felix, 1982 ; Wode, 1981 ; cited in Pienemann, 1984, 209). In terms of error correction, even if an instructor provides error correction,

whether it is implicit or explicit, it will not be acquired by the learner if their ability to process the language has not developed, and the learner will most likely make the same error again, especially in natural speech. This would suggest that the instructor would need to have an idea of what developmental stage the learner was at in order to determine if the error correction would be helpful or not. The instructor would also need to have an understanding of the hierarchies for processing ability to learn certain systems of morphosyntax to even know what would be appropriate to correct. Textbooks and traditional teaching methodologies in many cases, would not be helpful. Pienemann (1984) argues that all foreign language teaching methods focus mainly on “different methods of transmission” and follow the idea that “language is teachable” and “linguistic structures can be taught in many different orders” (Pienemann 1984, 209). The main problem of these teaching methodologies, however, is that they are often not based on how language is actually acquired (Vogel & Vogel 1975 ; Felix 1981 ; Felix and Simmet 1982 ; Pienemann 1983, cited in Pienemann 1984, 207). Pienemann (1984) does make a case for providing error correction, however, due to the possibility of generative entrenchment, which was discussed earlier. There is a danger of the interlanguage becoming fossilized at a simplified form. As evidence, Pienemann shows that this fossilization often appears in minority groups who acquired their second language in a natural way, without explicit instruction (Pienemann 1978 ; Meisel, Clahsen, & Pienemann 1981 ; cited in Pienemann 1984, 209).

What should language teachers do in terms of error correction to help their students more efficiently acquire the target language? The first step, I believe, is to try and determine the actual developmental level of a learner’s interlanguage. This can be difficult to do for two reasons. One is that according to Processability Theory research, target language accuracy is not a valid measurement of language development (Pienemann 1998). This is because “learners develop grammatical accuracy at different rates and along different gradients for different grammatical structures” (Liebner & Pienemann 2011, 70). Also, Pienemann (1984, 1998, 2015) makes clear that there is a distinction between acquired language and language that has been memorized and reproduced. As he stated in his 1984 paper on his Teachability Hypothesis :

... although structures from Stage X can be successfully instructed at Stage

X-2 thus shortcutting the 'natural' order of acquisition, the learning cannot result in actual use of the structure in normal speech since processing it is not possible on the basis of procedures available to the learner at this point in the development (Pienemann, 1984 : 206).

In other words, just because a student can reproduce some syntactic structures correctly, doesn't mean that they have actually acquired it (Pienemann, 2015). Therefore, recording student errors in an interview or from a written test may not be indicative of the student's actual interlanguage development. The second reason for the difficulty in determining the level of interlanguage development is that there is a lot of learner variation in a learner's interlanguage even at similar processing ability levels due to the "hypothesis space" (Liebner and Pienemann 2011, 69). They suggest that learners will have a variety of language options to choose from at each level of processing development. Some of these choices will result in accurate target language utterances and others will not. When bad choices are made, Pienemann refers to this as the "Bad Choice Hypothesis" , and those bad choices made in the earlier stages of the processability hierarchy will "accumulate as the learner moves on" and "the interlanguage system will stabilize" with incorrect or very simplified target language (Liebner and Pienemann 2011, 73).

How can a teacher know the interlanguage development level of their students? Keßler and Liebner (2011) suggest using a system known as *Rapid Profiling*, a diagnostic tool based on the profile analysis approach (Crystal, Fletcher, and Garman 1984, cited in Keßler and Liebner 2011, 134), and developed by Manfred Pienemann into a kind of shorthand version known as *Rapid Profiling*. The system utilizes elicited speech samples from learners and a computer program to accurately determine the level of a learner's interlanguage. The system takes only 15-20 minutes to implement and the computer program can be accessed online. However, the system requires that teachers need approximately 16 hours of training with qualified instructors, which can make it impractical for widespread usage at the moment. If an instructor were able to make use of *Rapid Profile* and students could be divided into classes based on their actual level determined by PT, it would be much easier and more efficient for the instructor to give appropriate feedback and correction to more students. In a mixed

level class, *Rapid Profiling* would enable a teacher to decide if a particular error is worth correcting or not based on whether the number of students in the mixed-level class have acquired the necessary level of development. Some would benefit from the correction while others would not.

The next area the teacher would need to focus on would be the type of correction to provide for a student. Under a PT framework, the teacher would need to distinguish between developmental and variational errors (Keßler, Liebner & Mansouri 2011). As was shown before in the description of Processability Theory, there are clear, hierarchical stages to interlanguage development (See Appendix C). Here is an example of a developmental error. Let's assume that Kye is at stage 3 in interlanguage development. He says, "Geoff like dogs." According to the table in Appendix C, adding an 's' to the verb for 3rd person singular ('3-sg-s' in the table) is a stage 5 morphological structure and Kye is not developmentally ready to acquire this structure. Therefore, error correction would be ineffective. Kye might be able to reproduce the structure correctly in the same context in a classroom setting, but faced with a new context in a real communicative interaction, he will probably make the same error again. A variational error is concerned with errors at the same level of development or lower. As mentioned previously in the description of hypothesis space as a part of PT, a learner has a variety of language choices at different levels of development as the constraints on processing are removed. Sometimes the choices are correct, sometimes they are wrong. Our model student Kye says, "I ready." In the development stages, this would fall under stage 2, which includes basic phrases following Subject-Verb-Object (SVO). Kye is able to process this structure but his interlanguage used an omission strategy (dropping the verb) to make his sentence. According to PT, it is very important to correct this mistake for 2 reasons. One reason is that Kye is developmentally ready and he can indeed acquire it. The second reason, and perhaps more importantly, if the error is not corrected, it may continue on and lead to generative entrenchment, or stabilization and a simplified form of the target language (Long 2003 : Pienemann 2006, cited in Keßler, Liebner & Mansouri 2011, 154) . As suggested before in the description of PT, if a structure at a lower level of development becomes stabilized, it will continue on through the different stages. As Pienemann (1998) states, "... developmentally early decisions bias the further development of the

interlanguage system" (15).

Another implication for error correction in a PT framework is that just because a learner is able to process a structure, that does not mean that they will. Peinemann (1998, cited in Keßler, Liebner & Mansouri 2011, 150) suggests that a functional need would also have to be present in order for the language to emerge. This would imply that error correction would be most effective when given during a task or in trying to accomplish a task using the L2.

One final implication on error correction in a PT framework is that it is not clear if a student can overcome the effects of generative entrenchment, where through bad hypothesis choices at very early stages, their present output is riddled with differences from the target language, such as in the case of immigrants who learn L2s naturally. The theory would suggest that it would be extremely difficult or maybe impossible to overcome TL errors in mature speakers. For error correction to be most effective, PT would suggest that it must occur very early on in the learning of the L2 in a second language classroom.

5. Conclusion

Processability Theory and the Teachability Hypothesis offer a lot in terms of describing how and under what conditions a TL may be acquired, and how a learner's interlanguage develops. Processability Theory shows us that there are clear language processing stages that remove constraints for the next level of language acquisition and also, that there is a lot of variability among learners. This variability can be seen at each stage and it is at the learning of language at these stages where a teacher could have the most impact by providing error correction and feedback so that the learner can be exposed to the best morphosyntactic structures for many contexts. The Teachability Hypothesis shows that it is important that error correction be given when it can have an effect, or when a learner is at the appropriate level to benefit from the correction of variational errors. As a teacher, knowing the developmental stage of our student's interlanguage seems to be an area that would have a lot of benefit for aiding students in acquiring the best morphosyntactic structures in various contexts for their stage of development.

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Appendices

Appendix A - A brief overview of teachability studies (Keßler, Liebner & Mansouri 2011,151)

Study	TL	Learner's L1	Design	Findings
Pienemann (1984)	German	Italian	Pre-test, Post-test control group design: whether stages can be skipped	Stages of acquisition cannot be skipped (Formulation of Teachability Hypothesis)
Ellis (1989)	German	English	Pre-test, Post-test control group design: formal vs. naturalistic instruction	Support for the Teachability Hypothesis
Boss (1996)	German	English / Chinese	Oral language production compared to taught syllabus as opposed to PT sequence	Learners progressed in the predicted order regardless of the taught syllabus
Spada and Lightbown (1999)	ESL	French	Pre-test, Post-test control group design: whether stages can be skipped	Inconclusive: no support for Teachability Hypothesis ¹
Dyson (1996)	ESL	Spanish	Longitudinal study of ESL development with a syllabus based on teachable forms	Overall support for the Teachability Hypothesis despite individual learner variation
Mansouri & Duffy (2005)	ESL	Chinese / Korean / Thai	Pre-test, Post-test control group design: developmental versus reversed order group	Support for the Teachability Hypothesis
<p>1. This study was inconclusive because the informants had already acquired the test structure in the pre-test. Also, the study is based on the false assumption that the Teachability Hypothesis predicts that "timed intervention" will promote acquisition (Pieneman and Keßler in press).</p>				

Appendix B - The developmental stages of German word order and how they are accounted for by Processability Theory (Pienemann 1998, 9)

Stage	Developmental Stage	PT Explanation
Stage x	<p>Canonical order (SVO) <i>die kinder spielen mit dem ball</i> (the children play with the ball) Learners' initial hypothesis is that German is SVO, with adverbials in sentence-final position</p>	<p>This does not involve any feature unification and therefore corresponds to level two of the processing hierarchy.</p>
Stage x+1	<p>Adverb preposing <i>da kinder spielen</i> (there children play) Learners now place the adverb in sentence-initial position, but keep the SVO order (no verb subject inversion)</p>	<p>The adverb is topicalized; there is still no exchange of grammatical information.</p>
Stage x+2	<p>Verb separation <i>alle kinder muss die pause machen</i> (all children must the break have) Learners now place the non-finite verbal element (here machen) in clause-final position.</p>	<p>For this split-verb construction to occur, both parts of the verb have to be unified, that is the participle value of the main verb and the auxiliary entry. This exchange of information occurs across constituent boundaries. However, the non-canonical position is perceptually salient (it is in final position).</p>
Stage x+3	<p>Verb second / Inversion <i>dam hat sie wieder die knock gebringt</i> (then has she again the bone brought) Learners now place the finite verb element (hat) in sentence-second position, resulting in verb-subject inversion.</p>	<p>This rule involves the unification of the feature requiring inversion of the verb and its subject across V and another phrase. It cannot rely on saliency principles.</p>
Stage x+4	<p>Verb-end <i>er sagte, dass er nach house kommt</i> (he said that he home comes) Learners place the finite verb (kommt) in clause final position in subordinate clauses.</p>	<p>In the LFG framework, features of embedded clauses which distinguish them from main clauses are acquired after word order constraints in the main clause have been acquired.</p>

Appendix C - Explaining ESL development: Morphology and Syntax (Pienemann 2011, 63)

Processing Procedures	Information exchange + other principles	Morphology	Syntax
6. subordinate clause-procedure	main and subordinate clause		<u>cancel inversion</u> <i>I asked when he could come home</i>
5. S-procedure	Topicalization of core argument, information exchange within S	<u>inter-phrasal morph.</u> (S) -SV- agreement (eg. Peter likes Mary)	<u>Do-2nd</u> <i>Why does he like dogs?</i> <u>Aux-2nd</u> <i>When will she return?</i>
4. VP-procedure	information exchange within VP		<u>Yes/no inversion</u> <i>Will she return?</i> <u>copula inversion</u> <i>Is he at home?</i>
3. phrasal procedure	information exchange within NP	<u>phrasal morphemes</u> NP agreement (eg. many dogs)	<u>Adv-fronting</u> <i>The man sit on chair.</i> <u>WH-fronting</u> <i>Why man sit on chair?</i> <u>Do-fronting</u> <i>Do man sit on chair?</i>
2. Category procedure	Unmarked Alignment- no information exchange	<u>lexical morphemes</u> Plural -s (dogs), -ed (PAST), -ing (PROG)	<u>Canonical word order:</u> SVO (Man sit on chair)
word / lemma access	word access, no information exchange	words	---